



A.D. 1854 . . . . . N° 1793.

SPECIFICATION

OF

WILLIAM JOHNSON.

FURNACES.

LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,

PRINTERS TO HER MAJESTY:

PUBLISHED AT THE GREAT SEAL PATENT OFFICE,

25, SOUTHAMPTON BUILDINGS, HOLBORN.

Price 7d.

1855.







---

A.D. 1854 . . . . . N° 1793.

---

## Furnaces.

---

**LETTERS PATENT** to William Johnson, of 47, Lincoln's Inn Fields, in the County of Middlesex, and of Glasgow, North Britain, Civil Engineer, for the Invention of "**IMPROVEMENTS IN FURNACES, AND IN THE CONSUMPTION OR PREVENTION OF SMOKE.**"—A communication from Edme Lambert, of Troyes, in the Empire of France, Merchant.

Sealed the 30th January 1855, and dated the 16th August 1854.

---

**PROVISIONAL SPECIFICATION** left by the said William Johnson at the Office of the Commissioners of Patents, with his Petition on the 16th August 1854.

I, WILLIAM JOHNSON, of 47, Lincoln's Inn Fields, in the County of  
5 Middlesex, and of Glasgow, North Britain, Civil Engineer, do hereby declare the nature of the said Invention for "**IMPROVEMENTS IN FURNACES, AND IN THE CONSUMPTION OR PREVENTION OF SMOKE,**" a communication from Edme Lambert, of Troyes, in the Empire of France, Merchant, to be as follows:—

This Invention relates to the so arranging the details of steam boiler and  
10 other furnaces, that, by the aid of a fan or exhausting or blowing apparatus, whatever smoke or unconsumed gases may be passed off from furnace may be consumed or turned to economical account in the furnace itself by a subsequent application therein. As the smoke or current of unconsumed gaseous matter passes off from the furnace at the further end or discharge outlet in the usual



*Johnson's Impts. in Furnaces, and in the Consumption or Prevention of Smoke.*

manner, it is received into a pipe or conveying duct, which has in its line or in connection with it a fan blower or exhauster, this blower being employed for the purpose of re-conveying the gaseous current into the front of the furnace for final and complete combustion. A furnace fitted up in this manner may be worked with little or no aid from a chimney, preserving an excellent draught, 5 and very greatly economising the consumption of fuel. In fact, if a chimney is employed, it need only be put to use prior to the generation of the working steam on starting; when fully at work the chimney connection may be cut off. The fan receives its gaseous supply on both sides from two curved branch pipes, so arranged that a proportion of atmospheric air shall be mingled with the passing 10 smoke. This combined or compound aeriform current is then carried forward and passed through the furnace wall, and thence up through the bars into the incandescent fuel upon them. The spindle of the fan is tubular, and has a stream of cold water passed through it to keep it cool and in good working order. 15

---

**SPECIFICATION** in pursuance of the conditions of the Letters Patent, filed by the said William Johnson in the Great Seal Patent Office on the 14th February 1855.

**TO ALL TO WHOM THESE PRESENTS SHALL COME**, I, WILLIAM JOHNSON, of 47, Lincoln's Inn Fields, in the County of Middlesex, and of 20 Glasgow, North Britain, Civil Engineer, send greeting.

**WHEREAS** Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Sixteenth day of August, in the year of our Lord One thousand eight hundred and fifty-four, in the eighteenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said William 25 Johnson, Her special license that I, the said William Johnson, my executors, administrators, and assigns, or such others as I, the said William Johnson, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the 30 United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN FURNACES, AND IN THE CONSUMPTION OR PREVENTION OF SMOKE**," a communication from Edme Lambert, of Troyes, in the Empire of France, Merchant, upon the condition (amongst others)



---

*Johnson's Impts. in Furnaces, and in the Consumption or Prevention of Smoke.*

---

that I, the said William Johnson, by an instrument in writing under my hand and seal, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar  
5 months next and immediately after the date of the said Letters Patent.

**NOW KNOW YE**, that I, the said William Johnson, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the accompanying Drawings and to the  
10 letters and figures marked thereon, that is to say :—

The said Invention relates to the so arranging the details of steam boiler and other furnaces, that, by the aid of a fan or exhausting or blowing apparatus, whatever smoke or unconsumed combustible gases may be passed off from the furnace may be consumed or turned to economical account in the  
15 furnace itself by a subsequent application therein. As the smoke or current of unconsumed gaseous matter passes off from the furnace at the further end or discharge outlet in the usual manner, it is received into a pipe or conveying duct, which has in its line or in connection with it a fan blower or exhauster, this blower being employed for the purpose of re-conveying the gaseous  
20 current into the front of the furnace for final and complete combustion. A furnace fitted up in this manner may be worked with little or no aid from a chimney, preserving an excellent draught, and every greatly economising the consumption of fuel. In fact, if a chimney is employed, it need only be put to use prior to the generation of the working steam on starting; when fully at  
25 work the chimney connection may be cut off. The fan receives its gaseous supply by a curved branch pipe, so arranged that a proportion of atmospheric air shall be mingled with the passing smoke. This combined or compound aeriform current is then carried forward and passed through the furnace wall, and thence up through the bars into the incandescent fuel upon them. The  
30 spindle of the fan is tubular, and has a stream of cold water passed through it to keep it cool, and in good working order.

And in order that the said Invention may be properly understood, I shall now proceed to describe the explanatory Figures on the Sheet of Drawings hereunto attached.

35 Figure 1 on the Sheet of Drawings is a transverse vertical section of a steam boiler furnace, shewing the adaptation thereto of the improved smoke-consuming apparatus; Figure 2 is a horizontal section through the boiler, and through the flue leading to the chimney. The furnace A and boiler B may be



---

*Johnson's Impts. in Furnaces, and in the Consumption or Prevention of Smoke.*

---

constructed according to any of the plans at present in use. The flames and gases pass along the flues C, which conduct them to the chimney stalk at D. Into this chimney is introduced the end of a pipe E, leading to a blowing and exhausting fan F, and this fan draws the smoke and gases, and discharges them along the pipe G, which conducts them into the ash-pit H; so as to cause 5 them to pass again through the fire. The fan is driven by means of the pulleys I upon its spindle J, and this spindle is hollow, to allow a stream of cold water to pass through it from the cistern K, in order to prevent its becoming too much heated. The fan is set in and out of gear by means of the lever L for shifting the driving belt. When the fan is in action, the 10 passage of the smoke up the chimney D is cut off by the damper M. A small space is left at N, between the end of the pipe E and the fan F, in order that a portion of atmospheric air may be drawn into the fan along with the gases from the furnace, this supply of atmospheric air being needed to carry on the combustion in the furnace. By means of the apparatus just described a 15 current is made to circulate through the furnace A, the flues C, the pipe E, the fan F, and the pipe G, which last communicates with the ash-pit H, whence the current again passes through the furnace, and so on, continuously. In this manner the smoke and gaseous matter which leaves the flues C without being consumed is again conducted through the furnace until it is entirely consumed 20 and has given out all the heat derivable from its combustion. To allow of the gradual escape of incombustible gaseous matter, a pipe *a* is made to open up a communication between the ash-pit and the external atmosphere; and a similar provision is made for this gaseous discharge from the furnace itself by the pipe 25 *b*, opening into each side of the furnace.

Having now described and particularly ascertained the nature of the said Invention, and the manner in which the same is or may be used or carried into effect, I may observe, in conclusion, that I do not confine or restrict myself to the precise details or arrangements which I have had occasion to describe or refer to, as many variations may be made therefrom without deviating from the 30 principles or main features of the Invention; but what I consider to be novel and original, and therefore claim as the Invention secured to me by the herein-before in part recited Letters Patent, is,—

First, the general arrangement and construction of apparatus to be applied to furnaces for the purpose of consuming or preventing smoke, as herein-before 35 described.

Second, the system or mode of consuming or preventing smoke, by causing the gases from furnaces to be conveyed a second time or oftener through the



FIG. 1.

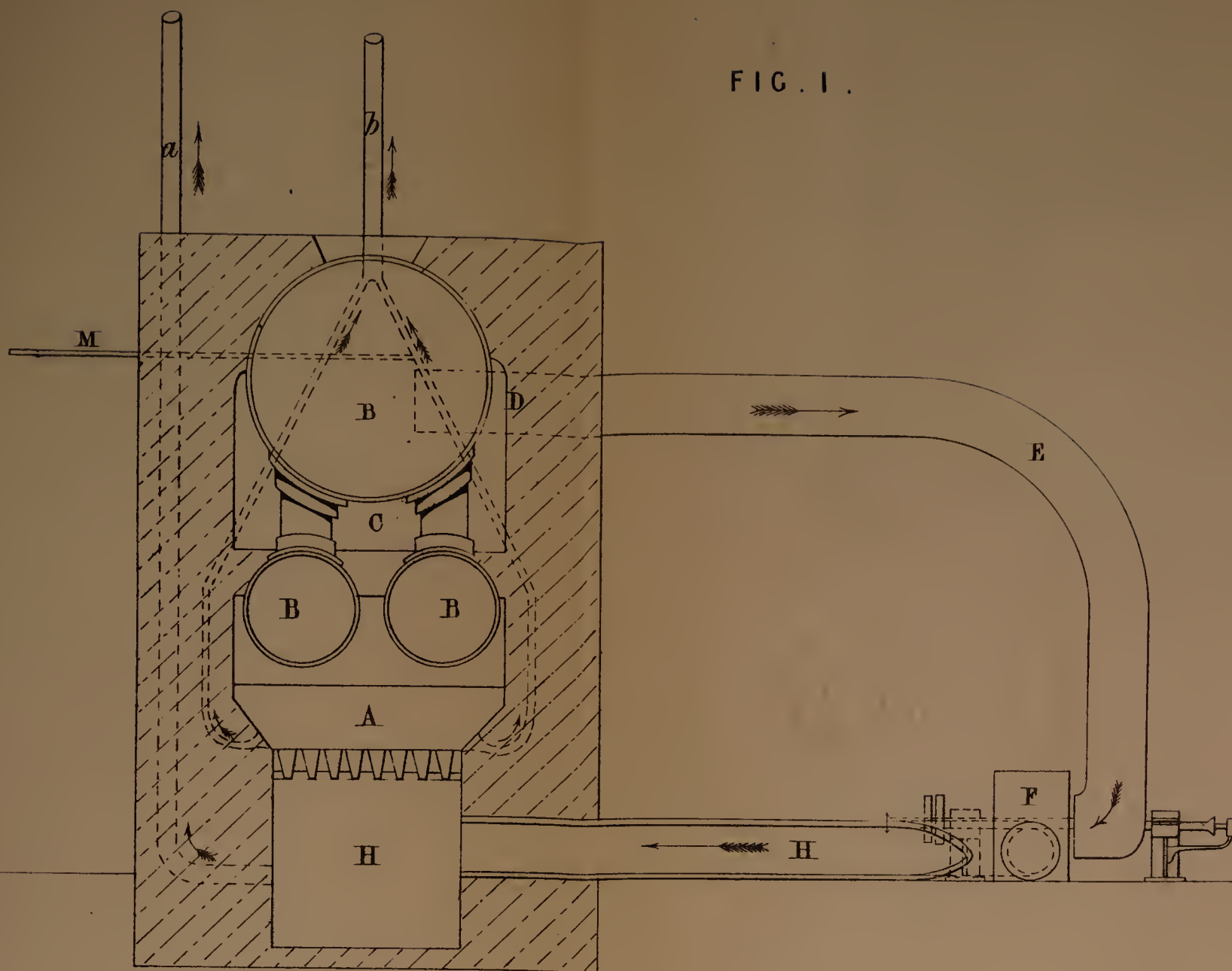
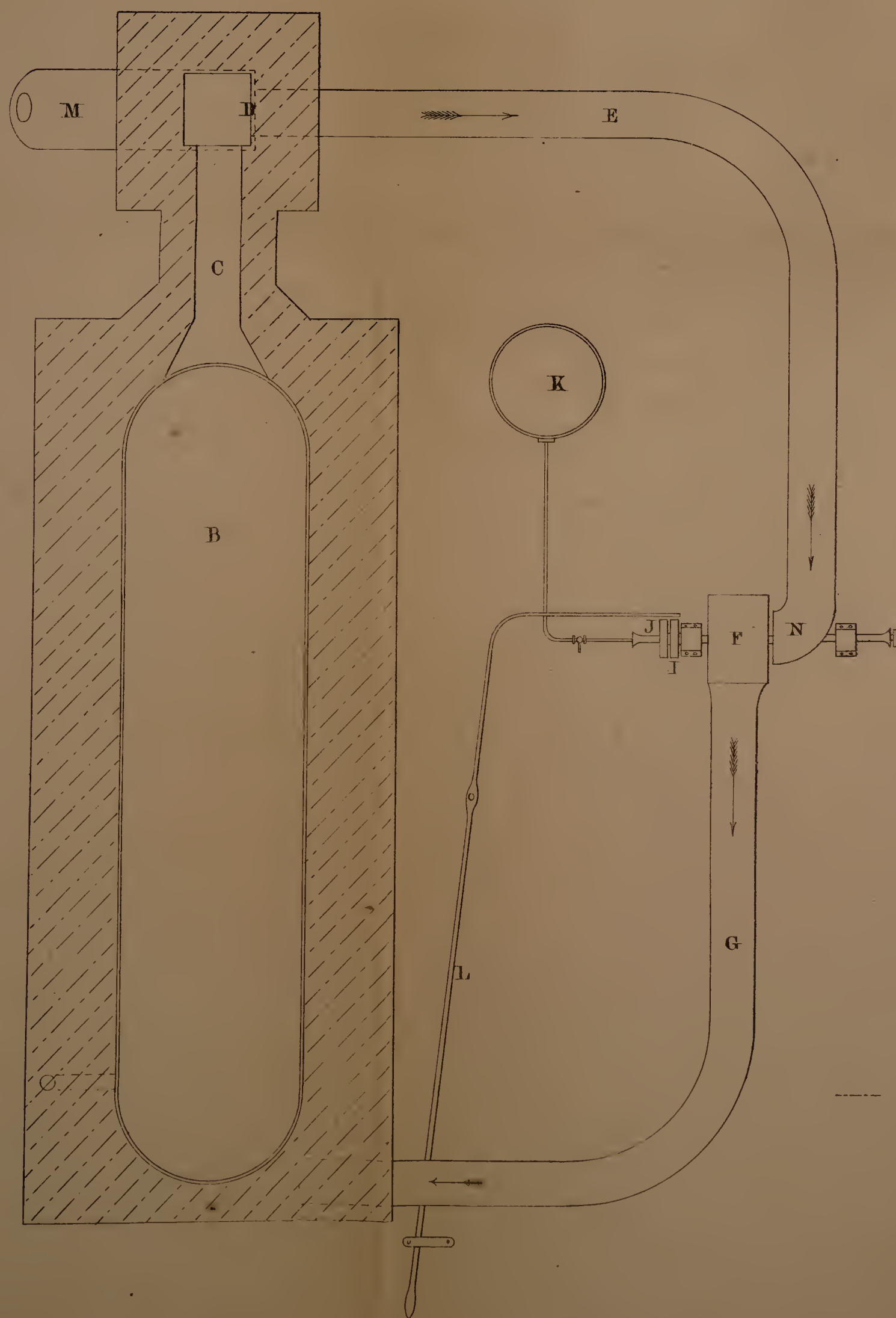


FIG. 2.







---

*Johnson's Impts. in Furnaces, and in the Consumption or Prevention of Smoke.*

---

furnace by means of exhausting and blowing apparatus, as herein-before described.

Third, the system or mode of conducting the gases from furnaces along with fresh atmospheric air beneath the fire bars so as to pass again through the  
5 furnace, as herein-before described.

In witness whereof, I, the said William Johnson, have hereunto set my hand and seal, this Thirteenth day of February, in the year of our Lord One thousand eight hundred and fifty-five.

W<sup>M</sup> JOHNSON. (L.S.)

---

LONDON :

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,  
Printers to the Queen's most Excellent Majesty. 1855.

1877 March 25th

Friday

Received of the Hon. Secy of the Interior  
for the same \$100.00

for the same \$100.00

for the same \$100.00

for the same \$100.00

for the same \$100.00